

The cited Itoh reference discloses a field emitter having a gate material that acts as a getter to prevent oxygen from forming an oxide on the emitter (Itoh's abstract; col. 2, lines 10-14, 17-20 and 65-67; col. 3, lines 4-10 and 60-63; col. 4, lines 1-3 and 31-36).

The cited Kumar reference discloses a triode flat panel display with field emission cathode having a layer of low work function material having a flat emission surface (abstract and col. 4, line 58). Kumar is used in the outstanding Office Action to show the missing feature of silicon emitters.

The cited reference of Jin is used in the outstanding Office Action to show that a coating embedded in the surface of the emitter is known. Applicant submits that Jin does not disclose anything that one of ordinary skill in the art would understand to be an embedded coating. The Jin reference discloses that commercial diamond particles reduces the work function of emitters, as is also shown in Kumar, but does not embed the particles in the emitter. Jin discloses forming layers on the emitter of diamond particles in an aqueous solution (col. 3, lines 13-15) which form a coating (col. 4, line 33), or using diamond particles in molten solder applied to the surface of the emitter (col. 4, line 67), or embedded into a soft metal coating (which would be impossible in Applicant's invention of a silicon emitter), or variously held to the emitter surface by electrostatic force (col. 5, line 3), sprinkling (col. 5, line 4), or by chemical bonding (col. 5, line 7) which Applicant contends means gluing. The Jin reference does not disclose silicon emitters, but refers to a conductive layer "on the surface" of the emitter containing carbides, including silicon carbide (col. 5, lines 7-14).

Applicant respectfully submits that Kumar discloses problems with sharp point field emission devices at least at col. 1, line 52, and at col. 2, lines 6, 40 and 64. Applicant submits that the portion of the Kumar reference indicated by the Examiner does not teach the use of silicon emitters, but rather is in the background section and discusses a problem in the invention of Spindt that Kumar intends to correct, namely that the use of tungsten, molybdenum or silicon emitters requires high extraction fields (col. 2, line 62). Applicant submits that the cited reference does not provide motivation to one of ordinary skill in the art to combine a silicon emitter with the device of the Itoh reference, but rather teaches away from the claimed arrangement by indicating that silicon is a poor material choice, and by teaching a smooth emitting surface with no sharp tips, and by having a low work function layer of diamond on top

of the emitter conductive layer. Applicant respectfully submits that the suggested combination of Itoh with Kumar is improper and does not disclose or suggest the feature of using silicon emitter micro tips.

Applicant respectfully submits that the suggested combination of references, whether taken alone or in any combination, still does not describe or suggest at least the claimed features of “...*at least one emitter comprising silicon having a coating embedded in the surface of the at least one emitter that releases electrons at a predetermined energy level, the coating acts in the presence of outgassing to inhibit degradation of the at least one emitter ...*”, as recited in independent claim 1. Applicant submits that none of the cited references disclose a coating embedded in the surface of a silicon emitter, and further, the Kumar reference teaches away from the use of silicon emitters and only mentions them as a problem to be solved due to high required field strengths. None of the cited references disclose the use of an emitter coating that inhibits degradation of the emitter. Dependent claims 2-4 are seen as being patentable at least as depending from a patentable base claim.

Applicant respectfully submits that the suggested combination of references, whether taken alone or in any combination, still does not describe or suggest at least the claimed features of “...*at least one emitter comprising silicon having a coating embedded in the surface of the at least one emitter that releases electrons at a predetermined energy level, the coating decomposes at least one matter in the presence of outgassing to inhibit degradation of the at least one emitter, wherein the outgassing includes organic matters...*”, as recited in independent claim 11. The reasoning for claim 11 is similar to that used above with reference to claim 1, since the claim language is similar on the points of use of embedded films and the use of the coating to inhibit degradation of the emitter. Dependent claims 12-15 are seen as being patentable at least as depending from a patentable base claim.

In view of the above discussion, Applicant respectfully requests that this rejection be reconsidered and withdrawn.

Claim 5 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Itoh et al. in view of Kumar et al. , Jin et al., and Takemura (U.S. Patent No. 5,666,020). Applicant respectfully traverses this rejection.

The cited Itoh, Kumar and Jin references have features discussed above. The cited Takemura reference discloses an emitter with a top portion of the emitter tip having the highest resistance of any other part of the emitter (col. 4, lines 45-48 and col. 5, lines 13-16), and that it is preferred that the emitter has a resistance that increases toward the top of the emitter.

Applicant respectfully submits that Takemura is different from the presently claimed structure, at least in that the top of the emitter is coated with a third material (col. 5, lines 22-23), as compared to the presently claimed invention having an emitter coating that is embedded in the emitter and covers substantially the entire emitter 401, over the distance labeled 425 in Figures 4B and 4C.

In particular, Applicant respectfully submits that the suggested combination of references, whether taken alone or in any combination, still does not describe or suggest at least the claimed features of “...*emitter comprising silicon having a coating embedded in the surface of the at least one emitter that releases electrons at a predetermined energy level, the coating acts in the presence of outgassing to inhibit degradation of the at least one emitter ...*”, as recited in claim 1, from which claim 5 depends. In view of the above discussion, Applicant respectfully requests that this rejection be reconsidered and withdrawn.

Claim 7 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Itoh et al. in view of Kumar et al., Pack et al. (U.S. Patent No. 5,921,838) and Jin et al. Applicant respectfully traverses this rejection.

The cited references of Itoh, Kumar and Jin have features that have been discussed above. The Pack reference is used in the outstanding Office Action to show that a platinum coating is known.

Applicant respectfully submits that whether or not the cited Pack reference discloses the use of Platinum as an emitter coating, the suggested combination of references, whether taken alone or in any combination, still does not describe or suggest at least the claimed features of “...*at least one emitter comprising silicon having a platinum coating embedded in the surface of the at least one emitter that releases electrons at a predetermined energy level, the platinum coating decomposes at least one matter in the presence of outgassing to inhibit degradation of the at least one emitter ...*”, as recited in claim 7. As discussed above, the suggested

combination of references does not disclose embedded coatings, or inhibiting degradation of the emitter. In view of the above, Applicant respectfully requests that this rejection be reconsidered and withdrawn.

Claim 8 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Takemura in view of Itoh et al. and Jin et al. Applicant respectfully traverses this rejection.

The cited references of Takemura, Itoh and Jin have features discussed above. Applicant respectfully submits that the suggested combination of references, whether taken alone or in any combination, still does not describe or suggest at least the claimed features of an “... *emitter having a platinum silicide coating embedded in the surface of the at least one emitter that releases electrons at a predetermined energy level, the platinum silicide coating decomposes at least one matter in the presence of outgassing to inhibit degradation of the at least one emitter, the outgassing including organic matters...*”, as recited in claim 8. As discussed above in regard to the prior rejections, none of the suggested references disclose embedded coatings, or inhibiting degradation of the emitter. In view of the above, Applicant respectfully requests that this rejection be reconsidered and withdrawn.

Claim 16 and 17 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Itoh et al. in view of Kumar et al. , Jin et al., and Tjaden et al. (U.S. Patent No. 5,770,919). Applicant respectfully traverses this rejection.

The cited references of Itoh, Kumar and Jin have features discussed above. The cited reference of Tjaden is used in the Office Action to show that light emitting targets coated with luminescent matter are known. Applicant respectfully submits that the Tjaden reference fails to correct the previously noted failures of the other suggested reference to describe or suggest the features of “...*at least one emitter comprising silicon having a coating embedded in the surface of the at least one emitter that releases electrons at a predetermined energy level, the coating acts in the presence of the outgassing to inhibit degradation of the at least one emitter ...*”, as recited in claim 15, from which claims 16 and 17 depend. Thus Applicant submits that the disclosure of luminescent materials in Tjaden does not change the fact that the suggested combination of references still fails to describe or suggest an embedded coating in a silicon

emitter that also inhibits degradation. Applicant respectfully requests that this rejection be reconsidered and withdrawn.

Claims 18-22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hush (U.S. Patent No. 5,663,742) in view of Takemura and Jin et al. Applicant respectfully traverses this rejection.

The cited references of Takemura and Jin have features discussed above. The cited Hush reference is basically used in the Office Action to show that video displays are known. The other features of the claims are suggested in the Office Action to be supplied by Takemura (an emitter with a coating) and Jin. Applicant respectfully submits that the Hush reference fails to correct the previously noted failures of the other suggested reference to describe or suggest the features of “...*at least one emitter having a coating embedded in the surface of the at least one emitter that releases electrons at a predetermined energy level, the coating is stable in the presence of the outgassing...*”, as recited in independent claim 18, from which claims 19 to 22 depend. The reasoning is similar to that given above with reference to the previous rejections, namely suggested combination of references still fails to describe or suggest an embedded coating in a silicon emitter that is stable and does not degrade during outgassing. Thus Applicant submits that the disclosure of a video display in Hush does not change the fact that the suggested combination of references still fails to describe or suggest an embedded coating in a silicon emitter that also inhibits degradation. Applicant respectfully requests that this rejection be reconsidered and withdrawn.

Claims 23 and 24 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Hush in view of Takemura, Jin et al., and Haase et al. (U.S. Patent No. 5,684,358). Applicant respectfully traverses this rejection.

The cited references of Takemura and Jin have features discussed above. The cited Haase reference is basically used in the Office Action to show that flat panel television displays are known in the art. Applicant respectfully submits that the Haase reference fails to correct the previously noted failures of the other suggested references to describe or suggest at least the claimed features of “...*at least one emitter having a coating embedded in the surface of the at*

least one emitter that releases electrons at a predetermined energy level, the coating is stable in the presence of the outgassing...”, as recited in independent claim 18, from which claims 23 and 24 depend. The suggested combination of references still fails to describe or suggest an embedded coating in a silicon emitter that is stable and does not degrade during outgassing. Applicant submits that the disclosure of a flat panel television display in Haase does not change that the suggested combination of references fails to describe or suggest an embedded coating in a silicon emitter that also inhibits degradation. Applicant respectfully requests that this rejection be reconsidered and withdrawn.

Claim 26 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Itoh et al. in view Jin et al. Applicant respectfully traverses this rejection.

The cited reference of Itoh and Jin have been discussed above. Applicant respectfully submits that the suggested combination of references fails to describe or suggest the claimed feature of an “... *emitter having a coating that releases electrons at a predetermined energy level, the coating acts in the presence of outgassing to inhibit degradation of the at least one emitter, wherein the coating is embedded in the surface of the emitter ...*”, as recited in claim 26.

As discussed above, the Itoh and Jin references do not disclose a coating embedded in the surface of the emitter. Jin sprinkles the diamond particles on the surface of the emitter, or glues them to the surface, or attaches them to the surface with a solder. Itoh uses the gate electrode as the gettering agent and describes the coating as being on the emitter, and not embedded.

In view of the above, and in view of the previous similar discussion with regard to the previous rejections, Applicant respectfully requests that this rejection be reconsidered and withdrawn.

CONCLUSION

Applicant respectfully submits that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney, David Suhl, at (508) 865-8211 to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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